

## ABSTRACT OF THE DISCLOSURE

Several optical probes useful in downhole applications are provided. A first probe has a tip in the form of a cubical corner with the diagonal of the cubical corner aligned with the axis of the probe. A second probe has a tip formed in a 45° cone. In these designs, light will bounce respectively three times or twice, but still retain the same orientation. To facilitate drainage, the very tip of the probe may be rounded. Both designs also provide a probe with a large numerical aperture and both are useful for detecting reflectance and the holdup of a multiphase fluid. A third probe uses (hemi)spherical or paraboloid probe tip. The third probe tip has a small numerical aperture and is useful for detecting fluorescence and oil velocity. In all three embodiments, the base behind the probe tip may be tapered to facilitate fluid drainage.

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